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Message Board

The Internet for the Blind and Visually Impaired

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Abstract

A qualitative study of fifteen blind or visually impaired persons and sixteen professionals who work with blind and visually impaired persons sought to explore the potential role of the Internet in information provision for this group of people. Traditional forms of access to information such as print have meant that people who are blind and visually impaired have more difficulty in accessing the same range of information that people who are sighted take for granted. Increasingly, computers are being viewed as the solution to the problem of access to the printed

word. This study sought to understand the role of the Internet in information provision, within the context of other sources of information and everyday information needs. The article presents findings about the current ways in which people who are blind and visually impaired find information for their everyday lives; the role of the Internet in this process; barriers to using computers and the Internet; and three case studies in information seeking.

Introduction

There is a growing body of knowledge about disability and access to online technologies. Discussion focuses on several main areas: guidelines on how to make websites disability-friendly; recommendations on the kinds of adaptive equipment available to people with different disabilities; and information on the latest developments in adaptive equipment. Barriers to using online services have had far less attention by comparison.

While there is literature about the information needs of people with disabilities in specific settings, for example in universities, there is very little known about information needs for everyday life. Roth (1991) surmised that the information needs of individuals with disabilities are likely to include, but not be limited to: service information, the nature of handicapping conditions, environmental accessibility, civil rights, financial assistance and advice, research and statistics, and service delivery models.

There appears to be little research on actual ownership and usage of computers by people who are blind and visually impaired, at least in Australia. In Australia a legally blind person is one who is defined as having: (1) a visual acuity of less than 6/60 with best corrected vision and both eyes open, e.g., a person is unable to see a letter at 6 metres which is designed to be seen at 60 metres, and/or (2) a visual field of less than 5 degrees of central vision which means a person has severe peripheral (side) vision loss, or central vision loss of greater than 10 degrees, which means that a person only has peripheral vision (Royal Victorian Institute for the Blind 2001).

In 1996, the Royal Blind Society (RBS) of NSW found that, of 116 legally blind persons, only 16% used a computer at home. In the U.S., a substantial study (Kaye, 2000) has recently been published, although this research focuses on people with work disabilities, rather than any specific disability group. A work disability is defined as 'a health problem or disability which prevents [people] from working or which limits the kind or amount of work they can do' (Kaye, 2000, p.3). The study consisted of an analysis of a 1999 survey conducted for the National Telecommunications and Information Administration (NTIA). It was found that people with work disabilities were less than half as likely as people without disabilities to have access to a computer at home (23.9% compared with 51.7%). Even more striking was the fact that "almost three times as many people without disabilities have the ability to connect to the Internet at home as those with disabilities - 31.1%, versus 11.4%" (Kaye, 2000, p.5).

In Australia, where the research reported in this article was undertaken, there has been rapid adoption of the Internet, although much of it has occurred quite

recently. The relevant figures available from the Australian Bureau of Statistics are for May, 1999, when 22.2% of Australian households had the Internet at home. This was an increase of 57% since May, 1998. The ABS plans to collect statistics about Internet use by people with disabilities in the future, but so far figures are unavailable in Australia (Roberts 2000). If Kaye's (2000) research is an indication, a small proportion of people with disabilities were connected to the Internet at the time the research reported in this article took place.

On the other hand, there are widely acknowledged benefits of computer technology and the Internet for people with disabilities. (See, e.g., Johnson & Moxon, 1998; Kaye, 2000; Newell, 1994). This has included an emphasis on the importance of the Internet in providing access to information to people with disabilities. This emphasis may reflect the broader goal of providing an "independent life" which the European Commission DGXIII (n.d., n.p.) described as when "persons with a disability take control over their lives, access the same opportunities and face the same choices in every-day life that non-disabled persons take for granted".

This article reports on an exploratory study which was undertaken in Australia during 1999 to investigate the potentialities of online services, particularly the Internet, as perceived by people who are blind and visually impaired, and those who work with them. This was undertaken in relation to other ways in which participants obtained information for everyday life. Because of the focus on "information," the World Wide Web (WWW) was the key aspect of the Internet under consideration. The study did not focus on what the latest technology to assist blind and vision-impaired people might be, although a section of the literature review gives a summary of key equipment and software. Rather than a technical study, which is the most prevalent type of research in the literature, the aim was to use qualitative techniques to understand the perceptions of people about the Internet, whether they were using it or not, including the positive and negative aspects, as well as the barriers to access. The importance of understanding the perceptions of people who are blind or visually impaired about these issues is underlined by the fact that, despite the putative benefits of Internet for people with disabilities, their access is well below that of people without disabilities (Kaye, 2000) The research questions relevant to the issues discussed in this article are:

- What are the current ways in which people who are blind and visually impaired find information for their everyday lives?
- What is the role of the Internet in this process?
- What are the negative impacts of the Internet?
- What are the barriers preventing blind and sight-impaired people from using computers and the Internet?

Three cases studies in information seeking will also be presented.

Conceptual Framework

There has been a distinct movement in the social sciences towards paradigms and methods which emphasize contextualised understandings of human behavior. This

has resulted in the increasing popularity of interpretivist or qualitative research approaches, and in particular ethnographic and naturalistic methods within the social sciences. Interpretivist precepts are based upon the idea that "there is no unique 'real world' that pre-exists and is independent of human mental activity and human symbolic language" (Bruner, 1986, p. 95; cited by Schwandt, 1998, p. 236). Knowledge and truth are therefore created rather than discovered, and there are often multiple, conflicting constructions of reality. Rather than attempting to ascertain general laws by which humans are said to exist, qualitative researchers are more concerned with focusing on the "processes by which meanings are created, negotiated, sustained, and modified within a specific human context" (Schwandt, 1998, p. 225). While qualitative methods have been used for research on Internet topics, we were unable to find other studies which explored the area of our interest: perceptions, understandings and feelings of people who are blind and visually impaired about information needs for everyday life, the role that the Internet might play, and the barriers which might prevent their gaining access.

Morley (1992, p. 168) noted that, in the move to contextualize our understandings within human environments, some argue that political understandings are blunted. He argued that it is necessary to integrate contextual understandings within larger political frameworks. Morley and Silverstone (1992, p. 202) argued that, in researching the social milieu of technologies (in their case they studied television), "practices have to be seen as situated within the facilitating and constraining micro-social environments... These in turn, must be seen as being situated within, but not necessarily determined by, those of neighbourhood, economy and culture" (p.202).

The Internet is but one medium through which people may access information, within a context of many sources such as interpersonal sources (particularly family and friends) and media (eg, television, radio, newspapers, books, journals). The potential of the Internet cannot be studied without reference to other sources through which information can be sought and it cannot be fully understood unless discussion is placed within the larger economic, political, psycho-social and cultural frameworks. In this case, it also cannot be understood except in relation to disability, which in turn must be placed within broader contexts. While this is a very large task to undertake within the limits of a journal article, we have particularly attempted to present the results of the study within these broader contexts. The literature review raises some of the contextual issues and the conclusion will attempt to draw the strands together.

Literature Review

The literature review begins with a discussion of "disability," in order to set the broader contexts for the project, alluded to above. Two relevant quotes from project participants are included. This is followed by discussions of: traditional forms of access to information, including the most favored traditional sources; the emerging role of the Internet in information provision; current assistive technologies for information provision and, finally, the barriers which prevent blind and sight-impaired people from using the Internet.

Disability and technology: broad, contextual issues

Sometimes you feel that you are not good enough, that you are not as welcome into society as everyone else, and that you are expected to work harder just to break even with a sighted person. And if you don't break even, then no-one blames you, because you have a disability. It's absolutely pathetic. (Participant from our study)

Many writers have talked about the ways in which people with disabilities are viewed by non-disabled society. Watson (1998) takes the position that people with disabilities "are portrayed as tragic victims of some unfortunate accident or disease, as people who do not function normally" (p. 147). Hunt (1966) argues that able-bodied people tend to deny the adjustments people with impairments make, and assume that they are making the best of a bad job, or putting on a good face. While some people may be putting on a good face, others who are genuinely happy are believed to be unfortunate persons who must have exceptional courage.

According to Gregory (1997), disability is not just about being different (e.g., left-handed or red-haired), but about how the difference is evaluated. In our society disability may be associated with an inability to perform efficiently certain tasks which have a particular significance. For example, people who are blind or deaf are considered to be disabled, but people who have lost their sense of smell are not, as this does not affect their ability to perform everyday tasks. The significance is likely to be different across different cultures, just as notions of normal and abnormal are likely to differ - according to culture and also time period involved (Corker, 1999).

Gregory (1997) claims that "disability, rather than being a biological given, can only be understood within particular social and cultural frameworks" (p.360). Disability, as a social category, defines people by what they cannot do, by an ability which is lacking. It legitimates disempowerment through the social and cultural ways in which expectations of disabled people are different, and this affects the ways in which people who are labelled "disabled" come to view themselves and their collective identity.

If I forget my goggles (spectacles) and I have to ask somebody: "What does that say?" or "Can you tell me where something or other is?", And there's a huge sign up there that says where it is, but I can't see it, I am seen to have a problem mentally... So I tend to hide it and say oh, I forgot my glasses. I use that quite often. You tend to not want people to know that you have a vision impairment, that you'd rather them think that you had just left your specs at home. (Participant from our study)

Technology is embedded in a technical and consumer culture but, for people with a disability, it is also embedded in a culture with particular ideas about disability. This is reflected in the ways in which technology is created only for people with certain abilities. With disability labeled as a consequence of biology, to be taken care of by the medical and welfare industries, responsibility has tended to be taken away from commercial companies to provide technology which is useful to a broader spectrum of needs. Perrett (1995, p. 41; cited by Jonhson & Moxon, 1998, p. 247) claimed that "many companies, particularly those whose products are marketed across the full spectrum of the population, considered disabled customers as a niche market at best, and an unwanted intrusion at worst" (p. 247). Currently, smaller companies mostly specialize in making adaptive equipment to

access mainstream technologies. This affects the cost of adaptive equipment. A number of circumstances are beginning to change this situation: the increasing proportion of people with visual impairments, as the population ages; the increased demand for technology to assist people with disabilities made by organizations such as libraries and disability support groups; and the growing awareness of needs to comply with the legislation which is now in place in countries such as United States and Australia .

Traditional forms of access to information

In terms of the literature on information-seeking behavior, a thorough literature search revealed no major study about either information needs for everyday life, or the sources of information most frequently used by people who are blind or visually impaired. This was also the case for people with other types of disabilities. It was therefore necessary to go to the literature about the information-seeking behavior of older people. It is in the older age group that disabilities are most prevalent. For example Williamson's (1995) study of older people, many of whom had disabilities, explored both information needs and the preferences for sources of information in considerable depth with 202 participants. She found that family members were ranked first of twelve sources considered important for information for everyday life (Williamson, 1995, 1998). Friends were ranked third. Similar findings were reported in British studies (Tinker, McCreadie, & Salvage, 1993; Todd, 1984): Family members and friends were at the top, or near the top of important sources. These findings reflect those for studies of the broader community, where interpersonal sources also emerge strongly (Chen & Hernon, 1982; Warner, Murray, & Palmour, 1973). Commonly in all studies, regardless of the age groups involved, interpersonal sources emerge ahead of media sources (particularly newspapers, television and radio), with institutional sources such as local councils and libraries less frequently used.

For a person who is blind, and cannot read Braille, access to printed material has traditionally been mediated through others, particularly a family member or friend, or perhaps a helper, or an organiation. Apart from assisted access to print, radio, audio cassettes and telephones have provided the main ways in which people who are blind or visually impaired have accessed information. Braille is only commonly used among those who have been blind since a young age. As a large proportion of people who are blind and visually impaired have become so later in life, Braille is not the most common form of communication. As funding is limited in organizations for people who are blind and visually impaired, only a small percentage of the printed information in the world is available on audiotape, radio, over the telephone or in Braille. The information may often be out-of-date by the time it is made available, and is expensive to convert into more accessible formats. While blind and visually impaired students and those who are employed can get printed materials converted to audio for free (in Australia at least), others usually cannot afford this.

The emerging role of the Internet in information provision

There is considerable discussion about the fact that the Internet and other online services are new technologies that open up windows of opportunity for everyone to participate in the new information age, and that there are particular benefits and potentialities for people with disabilities. There is no doubt that the opportunities for communication and information acquisition by people with disabilities are likely to

be significantly expanded through the Internet, and that this is already happening. For people in rural Australia (or in rural areas of other countries), where distance often exacerbates the isolation associated with disability, there can be particular benefits (Wolstenholme & Stanzel, 1997). With the WWW, blind people can browse information for the first time without requiring assistance in the form of reading on their behalf or the provision of alternative formats, with the subsequent delays that this entails. The Royal National Institute for the Blind (1998, n. p.) in the U. K. stated that "the Internet is one of the most significant developments since the invention of Braille... [because] for the first time ever many blind and partially sighted people have access to the same wealth of information as sighted people and on the same terms." The inventor of the WWW, Tim Berners-Lee, argued that "the power of the Web is in its universality. Access by everyone regardless of disability is an essential part" (http://www.w3.org/WAI)

Current Assistive Technologies for Information Provision

It is only possible for blind or visually impaired people to gain access to information provided through the WWW because of the availability of technologies which enlarge text or convert the information to audile or tactile media. The following presents a brief outline of the technologies most frequently used, either for computer or other electronic access, or for computer use in conjunction with the Internet.

Magnification programs for the computer screen allow people with some vision to view text or images which have been magnified several times and are capable of integrating hardware and software. *Synthetic speech* systems comprise a synthesizer, which does the speaking, and the screen reader, which tells the synthesizer what to say (American Federation for the Blind, 2000, n. p.).

Screen reader is the commonly-used name for Voice Output Technology. Hardware and software produce synthesized voice output for text displayed on the computer screen, as well as for keystrokes entered on the keyboard. (Adaptive Technology Resource Centre, 2000, n. p.). Screen readers can be used for all kinds of computer-assisted processes, including use of the Internet.

Optical character recognition (OCR) technology consists of three possible processes: scanning, recognition, and reading text. A printed document is scanned by a camera. OCR software then converts the images into recognized characters and words. The synthesizer in the OCR system then speaks the recognized text. Finally, the information is stored in an electronic form, either in a personal computer or in the memory of the OCR system itself. (American Foundation for the Blind, 2000, n. p.)

Braille printers are available for those who can read Braille. These produce a hard copy and can do so from various computer devices. Other *Braille Display* technology allows what is displayed on the computer screen to be transposed into Braille. These devices operate by raising and lowering different combinations of pins electronically to produce what appears on a portion of the computer screen. They are refreshable, that is, they change continuously as the user moves around

on the screen. (American Foundation for the Blind, 2000, n. p.)

Note takers are small electronic devices similar to electronic daily organizers available to anyone, with the exception that they have speech output and an optional Braille keyboard. (American Foundation for the Blind, 2000, n. p)

A *haptic* interface is a device which allows a user to interact with a computer by receiving tactile feed back. It is a force reflecting device which allows a user to touch, feel, manipulate, create, and/or alter simulated three-dimensional objects in a virtual environment (Office of Training Technology, 2000) Haptics was first developed so that users could feel objects in virtual environments. It is still a relatively new technology and may broaden the interaction between computer-stored information and blind or visual impaired people when the technology and training required become more freely available (Brewster, 2001, n. p.).

Barriers to the Use of New Technology and the Internet

Sinks and King (1998, n. p.) claim that there is "no known research to determine the reasons that adults with disabilities never achieve contact with the Internet." In their small study of fifteen participants they found that the most frequently cited barriers to use by people with disabilities were financial (80%), technical (60%), impairment (53%) and personal (47%). Another study, by Penney and Associates (1996), which was a commissioned study for the Ministry of Women's Equality in British Columbia, found that the biggest barrier to Internet connection was access to the basic equipment needed to get connected. They found that, for people with disabilities "who are not working or who are living on fixed income, such an investment in computer equipment may be unrealistic" (p. 7). The next greatest barrier was the cost of the adaptive equipment. The study also found that lack of appropriate and a ccessible training, attitudinal problems, language, and the design and rapid pace of change on the web were significant barriers.

There is also some commentary which assists in understanding the possible reasons why some people with disabilities never achieve connection to the Internet. Muller et al. (1997) indicated that the primary barriers to using supportive information technologies are economic, educational, and attitudinal. They also indicated that cultural influences may be significant factors. Technical knowledge is also often missing. Use of computers can also be impeded by negative attitudes towards technology in general, or computers specifically. Lack of exposure to computers is also a factor.

The issue of cost emerges strongly in the literature as a major barrier. The cost involved in owning equipment is prohibitive for many people with disabilities who are unemployed, on pensions, or working only part-time. Then, there is the additional cost of the Internet Service Provider (ISP) and telecommunications charges. People with disabilities are in the disadvantageous position of having to pay more for adaptive equipment in order to access mainstream equipment. As the adaptive equipment caters to a much smaller percentage of the population than mainstream equipment, its costs are often prohibitively high.

Problems with HTML and other technological challenges

In the U.S, the National Council on Disability (1998) reported that "the most significant barriers preventing people with sensory disabilities from achieving full and equal access to multimedia products are technological challenges" (p.6). These stem from a lack of awareness concerning accessibility issues by manufacturers and the high costs involved in producing accessibility solutions.

One of the major accessibility issues is inaccessible web design. While the original intention of the developers of the graphical-interface WWW was that the underlying HTML code (and other coding languages) would not disadvantage users with visual or other difficulties, this has not turned out to be the case.

In fact, bad web page design is a barrier which can be overcome relatively easily. Proper use of the HTML and other codes requires the use of alternate descriptions for images, and limitations on the use of tables for layout purposes. (Tables can pose a problem for screen-reading software). Properly designed tables provide descriptive information that is otherwise hidden to the visual user. Other coding options allow much easier tabbing through links or navigation without a mouse, as well as the inclusion of full-text explanations of acronyms that would otherwise be meaningless when put through a screen reader.

Another major area of concern to blind users is the use of PDF files. PDF files which contain images, charts, and diagrams are virtually unusable by people who are blind and visually impaired, although simple PDF files can be converted to HTML or text files.

Like HMTL, XML (EXtensible Markup Language) is a simplified version of SGML (Standard Generalized Markup Language). It is gaining in popularity because of its simplicity and because it is no less powerful than SGML. It has implication for web designers in that this language allows many more structured data types (such as spreadsheets and drawings) to be coded into text. It is a technology developed by the World Wide Web Consortium (W3C), which provides standards for the Web design industry, and provides accessible web page designers (and readers) with fewer restrictions to information provided and accessed through the Internet (Boss, 1999, n. p.).

As increasing numbers of web page designers comply with the internationally recognized Web Accessibility Initiative (WAI) guidelines developed by the W3C, blind and visually impaired people will gain greater access to the information available on the World Wide Web. The guidelines are available at www.w3c.org/wai.

Method

In order to gain a wider perspective on the issues to be addressed, we considered it worthwhile to interview not only people who were blind or visually impaired, but also people whose occupations addressed specifically the needs of this group of people. The sample was purposive, selected in an attempt to provide a balance of views between those who were connected to the Internet and those who were not.

Two techniques, focus groups and individual interviews, were used to explore the perceptions of blind and visually impaired people and those who work with them. The research began with a focus group of ten urban professionals (two of them blind) who worked with people who were blind or visually impaired. The focus group was used to establish some of the issues which would be important to follow up in subsequent interviews with blind or visually impaired people. Nine interviews followed with legally blind people who lived in Melbourne, Australia, in the state of Victoria. They were in various life circumstances and of a wide range of ages.

Another focus group of six rural professionals (three of whom were legally blind) was later conducted in the state of New South Wales. This focus group was used to establish some of the issues for visually impaired people who lived in rural areas, and how these might have differed from those in urban areas. This was followed by interviews with six legally blind people who lived in rural New South Wales. In total, views were sought from 31 people, of whom 20 were legally blind. The table, below, sets out details of all participants in the study who were legally blind, regardless of whether they were individual interviewees, or in the focus groups.

Participant Number	Gender	Age	Computer User	Internet User	Software Used for Computer/ Internet use
1	M	40-49	Yes	Yes	JAWS **and pwWebSpeak Braille embosser
2	F	40-49	Yes	No	Was using goggles, but eyesight deteriorating rapidly
3	F	30-39	No	No	
4	F	20-29	No	No	
5	F	40-49	Yes	Yes	JAWS
6	M	70-79	No	No	
7	F	70-79	No	No	
8	F	70-79	No	No	
9	M	40-49	Yes	Yes	Has learned JAWS, but doesn't like it. Can manage large font on black background for email
10	F	60-69	No	No	
11	F	20-29	Yes	Yes	Zoom Text
12	M	50-59	Yes	No	Artic Vision
13	F	60-69	No	No	
14	F	50-59	Yes	Yes	Zoom text which she prefers to JAWS
15	F	60-69	Yes	Yes	Double Talk, in conjunction with JAWS
16*	M	30-39	Yes	Yes	JAWS
17*	M	60-69	No	No	
18*	M	50-59	Yes	Yes	JAWS
19*	F	50-59	Yes	Yes	Zoom Text
20*	M	60-69	No	No	

Table 1. Characteristics of study participants.

*These participants were in the focus groups; all the others were individual interviewees.
** JAWS - (Job Access With Speech) provides speech technology that works with Windows

95/98/Me or Windows NT/2000 operating systems. JAWS uses an integrated voice synthesizer and the computer's sound card to convey the content of a computer screen to speakers (Henter-Joyce Inc. 2000).

As can be seen from the table, the sample of legally blind people was diverse. They were recruited through the major organizations for blind and visually impaired people. The reasons that we included a considerable number of people who did not use a computer or the Internet was because of the importance to the project of information-seeking behavior, defined very broadly. We wanted to understand the behavior both of people who had not as yet started to use the Internet, as well as those who had.

Data were analysed using the NUD.IST package for the analysis of qualitative data. NUD.IST is Australian software developed at La Trobe University in Victoria.

Results

The following results show the current ways in which people who are blind and visually impaired find information for their everyday lives; the role of the Internet in this process; barriers to using computers and the Internet; and three case studies in information seeking. The participant number next to each quote enables information about the participant to be identified in the table in the methods section. Professionals working with blind and vision- impaired people, who were not themselves visually impaired, are identified in the results as "Worker with blind and sight-impaired people".

Current ways of finding information

Everyone has a different set of strategies for finding the information they need for their daily living. Data from the project indicated that a very important contextual factor was whether or not those who were blind were living on their own. Participants who lived with someone, usually a spouse, received a great deal of support, including for information seeking. They still used other sources, but not as extensively as those in the former group, where participants depended a great deal on friends and relatives as well as organizations specifically for the blind, banks and local councils.

Family and friends were frequently mentioned as sources for most information topics. As mentioned, above, the importance of family and friends as a source of information for every day life emerges strongly in the literature about older people (e.g., Tinker, McCreadie, & Salvage, 1993; Todd, 1984; Williamson, 1995, 1998). It also seems that community information seeking, in general, involves frequent use of family members and friends (e.g., Chen & Hernon, 1982; Warner, Murray, & Palmour, 1973).

Radio emerged strongly as a source of information for participants in the study. In the Australian state of Victoria, there is a community radio service for the print handicapped (3RPH) and this proved popular with some participants. As Participant 8 said:

But now we do have our radio for the print handicapped. And also you learn

how to use the radio, whichever radio service is the best at giving you good up to date information and commentary.

Although radio has the general disadvantage of requiring its listeners to wait for information to come to them, its role for people with sight impairments is clearly highly significant because of their problems with print.

In terms of access to print, a number of Braille users talked about the problems. For example, Participant 5 said:

By the time a news bulletin is brailled, it's yesterday's news, it's old news. We are pretty well served in (brailled) magazine articles, but it is the immediate news and commentary that we tend to miss out on.

The problems of print were especially seen in relation to government information. The role of the organizations for the blind were appreciated for the assistance they give in disseminating printed government information in other formats:

Government bodies and welfare bodies etc. are not the best people at disseminating information. They wait for you to find out via someone who knows something, who knows something. You know, very rarely do they issue out information. They may issue out a little pamphlet but fortunately now our two major organizations for the blind are brailling or taping major information sheets, such as health and government benefits information. Safety matters, too, such as information from the fire services, and ambulance services. (Participant 7)

With regard to election information, Participant 7 saw a great improvement in recent times:

... these days, before an election, we are given a tape recording of the policies of the various parties and the candidates, so things have improved greatly.

The access to print offered by the Internet was noted as a significant step forward for people who are blind or seriously visually impaired. As well as the more traditional sources of information, a number of participants were using the Internet, both the WWW and email. Although eleven participants had a home computer, only nine were using the Internet. Even so, this was a disproportionate number in a sample of twenty people who were blind and visually impaired. Only 22.2% of Australians had a home computer in 1999 and the proportion of those with disabilities was likely to be considerably less. This disproportion is justified in that the sample was purposively selected so that a range of views on the issues of importance to the research was reflected.

The role of the Internet in information-seeking and communication

Oh I think it [the Internet] is tremendously important. It gives people quite a bit more independence and I find most people very, very enthusiastic once they've got over the initial hurdle of how to use it.. (Worker with blind and sight-impaired people)

There was a sense of excitement among the participants of the study about being

able to participate in the new virtual landscape which the Internet provides. There was also interest in being able to access information that was previously inaccessible. Participant 12, a man in his 50's, who lived in rural NSW, and had become blind later in life, was enthusiastic about the range of choices offered by the Internet:

To get a newspaper and read through the newspaper, you can't, so you've got to have someone read it. You can access the phones so that you can get the newspaper read to you, but they'll only read certain pages. So what page are you going to pick? And it costs you a fortune. If you can just go in and open up a page on your computer that says all your different newspapers and you decide you want the Telegraph or you want the Melbourne Times, and go in and just browse through the newspaper till you find what you want, and then read what you want. You know, that's great.

Not only does access to the Internet increase access to information for people who are blind or have vision impairments, but it also allows them to participate in a new information and communication format which has the potential to become a primary source for all people. In this way, people who are blind or visually impaired will not see themselves differently from the rest of the population:

I think the (Internet would play the) same role that it plays in the lives of everyone else. You know, for finding information, for research, for talking to other people, for keeping up to date with things. For me, it would also mean being able to contact lecturers, and having an email address so it wouldn't matter where I was someone could contact me. (Participant 2)

Because the Internet has the ability to provide unprecedented amounts of information, which can easily be located and read by the individual person, it also has the potential to make accessible activities that were previously closed to people who are blind and visually impaired. For example, Participant 15, who has worked in the radio industry, said:

There's no reason why I can't be a news writer and presenter. Because if I can get onto the relevant Internet sites at work, I can do the things that a sighted person can do. I can watch the news on the Internet, watch the developments and write the headlines for the half hour. You know that's a job that's often done on the radio and that's an example of a job that I will be able to do. Whereas without the Internet, that type of job wouldn't have been possible for me.

Another possible benefit of the Internet is its potential to provide a social connection to the outside world through its communicative abilities for those who are socially isolated. As one worker with blind and sight-impaired people noted:

There is quite a bit of loneliness out there and so to the extent that they create these virtual communities by exchanging email with each other or connecting onto a chatline, that makes a huge difference. You know, it sort of enlarges their world.

Negative Impacts of the Internet

One negative impact of the Internet was seen to be the possible increasing

isolation of people, who will carry on most of their lives behind a computer at home.

Potential for social contact may be reduced and personal contact is very important for people. (Worker with blind and visually impaired people)

This was seen to have possible ramifications both for social contact and for the obtaining of services. As Participant 16 said:

Governments and services such as banks are providing less face-to-face contact, communication and support, and more online information.

The major negative impact of the Internet was seen as not having access to it. As the Internet becomes more integral to the way in which people access information, those who miss out because of circumstances such as lack of income and education, will be doubly disadvantaged. Where the Internet will be making life easier and more efficient for many, there will be those whose only choice is the slower and less flexible information gathering methods. Participant 1 illustrated this point:

A lot of government and information services are put on the web. Well what would you do previously? Previously you had to physically front up to a department, play telephone tag. That's more of a problem for people with sight disabilities than for people who have sight.

Equally, if the Internet becomes the primary source of dissemination for certain organizations, such as governments, it will have negative impacts for those who are unable to access it. As this same participant noted:

If the Internet is the only means of communicating information, and you don't have access to it for resource purposes, it could be a disadvantage. We still have to ensure the information is available in other ways.

The reasons for possible lack of access are discussed in the next section.

Barriers to using the Internet

The most frequently mentioned barriers to using the Internet were: cost; fear of, and difficulties with using technology; and difficulties with obtaining training. The findings are mostly in keeping with those in the literature, cited above (Muller et al., 1997; Penney & Associates 1996; Sinks and King 1998).

Cost

Unlike the 'high-end' users so beloved by the computer industry, blind and visually impaired people tend to be hampered by lower-than-average incomes. The most frequently mentioned barrier to accessing the Internet was cost. It was an issue emphasised in the focus groups and was also cited by eight of the fifteen individual interviewees. Of the seven individual interviewees who did not mention it, five had access to equipment through either a current or former job, money from a family inheritance, or through other family members' equipment. At first glance this is a very different finding from that of the study by the Royal Blind Society of New South Wales (1996) on barriers to using computers, in which they indicated that

age was the key factor. However, many people who are blind or visually impaired are older, retired and on pensions, which means that the initial setting-up costs of a computer and adaptive equipment are more than their budgets can meet. Even the cost of mainstream equipment is still an expense that some people cannot afford. Participant 8 commented:

I am on a pension. If I had the means, there'd be no problem at all. I will meet it when I get to it. There could be a problem to anybody trying to cope on a pension.

Cost was also an issue for those who worked full-time and had a good income if they had a family to support. Participant 2 said:

It's hard when you've got a family and you are paying off your house and all this other stuff. It's very hard to find that sort of money. I'm sure a lot of people would tap into the Internet if they could afford the equipment.

The finding about cost in this study was also a different result from that stated by the National Council on Disability (1998) which indicated that technological challenges were the key barriers. However, for those who cannot afford to buy the equipment in the first place, the technological challenges of using the equipment are irrelevant. For those with limited income and savings, the cost of the Internet must be prioritised against a host of other recreational activities. Often it is as simple as: "if I have the Internet, then I can't have all the other things I want."

Not only is there the expense of adaptive hardware and software, but keeping it up-to-date was also seen as a major problem. Some blind and visually impaired people who were on pensions said they were reluctant to buy the equipment to access the Internet, because they knew they would struggle financially to keep it up-to-date.

Continually upgrading your adaptive software with the other things that have to be upgraded on your computer is a major problem. (Participant 19)

Apart from the constant need to update adaptive equipment to suit changing technologies, equipment needs can also change as eye conditions deteriorate, for example, as a result of diabetes.

The cost of equipment was usually not the only barrier mentioned, and other barriers were sometimes inextricably intertwined with the issue of cost. For example, some people viewed the current ways in which they accessed information as adequate for their particular lifestyles, and the Internet was viewed as an unnecessary luxury they could not afford, or that they would only pay for when life circumstances changed and the Internet became a necessity. Participant 17 said:

I'll get the Internet if I can see a use for it and a purpose that is valuable ... Communication is always an essential and if a person tended to be on their own and didn't have the help of either a wife or a friend then, I think, the likes of me and many others would find it very, very, difficult and the more opportunities that you have for communicating, then that is just definitely an advantage. So you have to see what's available and keep up with it. That's the only way I can see.

Fear of technology

Participants in the study were deterred from using the Internet by their lack of computer skills, as well as their lack of confidence in being able to use a computer without vision:

I think it doesn't matter whether you've got sight or not. For a lot of people, particularly older people, there's a big adjustment to actually using the technology and getting access to reasonable training and getting up to speed and feeling confident. It can be a very disempowering process trying to use online and Internet technology. (Worker with blind and visually impaired people)

People who are newly blind can show a particular reluctance to change familiar ways of doing things:

Newly blind show resistance to new ways of acquiring information and communicating. (Participant 16)

The issue of aesthetics also needs consideration. Adaptive technology is usually conspicuous and users feel embarrassed, particularly in the workplace. The helpful equipment has the unintended side effect of accentuating difference:

I don't like to broadcast the fact that I can't see very well. I don't mind acknowledging it. I don't mind reading things up close in public or anything like that. But I don't want it brought home to me every time I turn around. It helps if adaptive equipment looks nice because it indicates that just because you have a disability, it doesn't mean that you can't have something that looks nice. I think the aesthetics are missing from adaptive equipment, partly because there's always been a bit of a charity element associated with helping people with a disability. (Participant 9)

Difficulties with technology

While the Internet's dazzling technical wizardry has suddenly increased people's ability to communicate and to obtain information, it is still in the fledgling stage despite recent improvements. Computer software and hardware designers' "cool" tips, tricks and buttons might have plenty of dash, splash and panache, but they have not yet focused on all users' real needs. People who are blind and visually impaired are a 'niche' market; they have particular requirements which have largely been ignored by software and hardware developers.

Screen readers, particularly JAWS, were most commonly used by participants to access the Internet. However, a few of the participants had enough residual sight to persevere with using very large fonts on standard browsers, through Zoom Text in particular. Two of the participants had used scanners in combination with screen readers.

Only two of the participants had used note takers and they abandoned them after a short while, finding them impractical. Participant 5 said:

Sometimes it works, but sometimes it just locks up and it won't go and I've had it looked at and they've said, "Oh no, there's nothing wrong with it." I

mean it's a pest of a thing.

Another barrier mentioned was poor web design. Focus group participants largely agreed that there was low awareness of the need for well-designed search engines and web pages. Comments by some of the individual interviewees indicated that they also were aware of the need for accessible web design. Participants 14 and 15 both said that they often look up federal and state government web sites, although the former was critical about the poor design of some sites: "I spent a whole afternoon trying to find out the information. I did get it in the end, only because someone knew the address."

Blind and visually impaired people who live in rural Australia are disadvantaged, one of the workers in the focus groups believed, "by not having the wide range of cheap Internet providers that their urban counterparts do."

Difficulty of obtaining training

Funding for all areas of support for blind and visually impaired people is limited, and training people in the use of online technology is often not a high priority. Furthermore, equity of access to computer and online training for urban and rural blind and visually impaired people has yet to be achieved:

From my little corner of the world, it's not a matter of the ease or otherwise of using the stuff; it's (a matter of it) being available. The technology is there... I would love ... to have courses all the time... Down here we just can't.
(Participant 20)

Three case studies in information seeking

The cases now presented illustrate three different styles of finding information for everyday life. They illustrate the diversity of information-seeking behavior which we found in the research. The study found that life circumstances, such as being alone or having a family, working, or being unemployed, or retired, the type of vision impairment involved, as well as individual information-seeking preferences, all influenced the ways in which participants accessed information.

For example, Participant 10 was in her 60s, and lived at home with her grandson. Her elderly brother lived in an apartment at the back of her house. She had a small amount of peripheral sight which she only used occasionally to read small amounts of print. Despite this, she was an avid user of information - for utilitarian as well as entertainment purposes. A significant amount of her information came from radio (3RPH - radio station for the print handicapped), from taped newsletters from Vision Australia, an organization for the blind and visually impaired and from television. Her brother helped her with letters and her banking information. She herself was also a great information source, particularly as she had worked in an organization which deals with public information. She also said that her friends are very good sources of information. Her vision impairment developed later in life, and she viewed her lack of sight as the main barrier to learning to use the Internet. However, she also indicated that she had all the information she could possibly require from her current sources.

While Participant 10 was very dependent on disability organizations to provide her information (3RPH and Vision Australia), Participant 3 shied away from disability

organizations and tried to depend on her own resources to access information. The latter was in her 30s, and worked part time as a teacher in rural NSW. She very rarely sought information that was extraneous to the weekly routine of her life. Whereas Participant 10 was interested in accessing news, current affairs and human interest stories, Participant 3 only accessed the information she needed to carry out her daily tasks e.g., going to work and, shopping. This simplification of her life meant that she could cope with the small amount of information she needed to read such material as bank statements and bills by using her residual sight.

Participant 15, in her 60s, had also chosen not to rely on disability organizations for information, finding them not suitable for her particular needs. Instead she used a combination of radio (many different stations) and the Internet to acquire information. She managed to use both media at the same time, as she never turned her radio off, and she usually used the Internet for hours each day. She was an avid user of information.

All three women indicated that the particular ways in which they have chosen to seek information gave them independence they needed to conduct their lives. For Participant 10, relying on others (individuals and organizations) did not take her independence away, but increased it. On the other hand, the sense of independence of Participants 3 and 15 stemmed from being able to access information as a sighted person would, and therefore they preferred minimal contact with disability organizations. Participant 15, who preferred to use a scanner and screen reader rather than a person, to read her private correspondence commented:

There's all sorts of things that you perhaps want independence and privacy for. They're not bad or anything like that. You just want to be able to do them as a sighted person would.

Conclusions

Earlier in the paper, we stated that the potential of the Internet could not be understood without reference to other information sources, disability and the larger frameworks of economy and culture as well as the micro-social context. The importance of understanding the perceptions about issues of potentialities, as well as barriers, is underlined by the fact that, despite the putative benefits of Internet for people with disabilities, their level of access is well below that of people without disabilities (Kaye 2000).

Within the micro-social context, the Internet can mean many things to people with a disability: a luxury, a necessity, a way to participate in the information society, a way to gain access to more information than was previously available, or only one of the many ways of accessing information. It is also seen as a technology which may potentially disadvantage them if they cannot access it. Within this individual context, the lack of fit between the needs of the person with a disability and technology is of less concern than the economic practicalities of affording the equipment in the first place. In this sense the economic framework of our society impinges more than, or perhaps before, the technical-cultural.

In the present consumer society, there appears to be a continuum of participation: those who can afford to participate and do, those who can afford to participate but feel they have no need to, those who cannot afford to participate but would like to, and those who cannot afford to participate and feel they have no need to. The consumer society aims to target those who can afford to participate and this group of people tend to be able-bodied. Technology is aimed at an able-bodied, salaried group of people. People with disabilities tend to fall at the other end of the continuum: those who cannot afford to participate.

We are also living at a time during which information has become one of the most important commodities. New ways of presenting information which reach wider audiences and are cheaper and more efficient are being encouraged. The Internet is seen as the future of information provision because it has a world-wide audience. However, on a local scale, television, radio, newspapers, and newsletters are still recognized as legitimate forms of information and communication. For people who are blind or visually impaired, as with the rest of society, the Internet is a choice among many other media. Television and radio are very important ways in which they get information. Organizations for the blind are extremely important in disseminating information which is printed and family and friends are, as always, information sources. While a consumer society often stimulates more choice through competition, it also tends to converge on ways of disseminating information which are the cheapest. It is becoming clearer to many (particularly government departments) that it is cheaper and more convenient to provide information to the public via the Internet. If this form of information provision becomes the predominant one, those who have difficulty participating physically, economically, because they have a fear of technology, or lack training opportunities, will be disadvantaged.

In the meantime, there are many options available for getting information and the Internet is not yet a necessity. Whether people are being disadvantaged when they have difficulty in accessing a technology which is not as yet a necessity is a difficult question. It seems pointless to answer this question with a blanket statement of 'yes' or 'no', as some people clearly get all the information they need for their lives without using the Internet, and others indicate that they would clearly benefit from using the Internet. It is best to answer this question from the standpoint of each individual's need. As people's needs change according to their changes in lifestyles and life stages, their need to access the Internet likely to change. What is clear is that the choice for participation should be available to everyone.

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